higher risk for a worse early and mid term clinical evolution as well as mid term LVEF changes after AMI. This data may stimulate further research to fully define MRI role in larger trials.

986-9 Multislice Magnetic Resonance Imaging of Myocardial Perfusion Using Gd-HP-DO3A on a Conventional Clinical Scanner: A Comparison Study With Radionuclide Perfusion Imaging in a General Patient Population

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We have compared the results of first-pass magnetic resonance imaging of myocardial perfusion using the contrast agent Gd-HP-DO3A (Bracco, Spa.) to those obtained from radionuclide imaging in a population of 63 patients referred for perfusion studies owing to known or suspected CAD. Short axis MR perfusion images were acquired at 3 or 4 tomographic levels with heartbeat or alternate heartbeat temporal resolution during the first pass of a bolus of Gd-HP-DO3A (0.08 to 0.1 mmol/kg) administered using a prototype power injector (Medrad, Inc.) over 2–3 s. MR perfusion images were acquired under dipyridamole (0.56 mg/kg) vasodilation conditions along with administration of 99m-Tc-sestamibi. Patients also received 201-Tl resting radionuclide scans on the same day as their MR perfusion images.

For analysis, short axis representations were divided into six regions corresponding to anterior, anterolateral, inferolateral, inferior, inferoseptum and anteroseptum. A total of 1355 regions were compared. MR image perfusion defects were defined as greater than 1.5sd reduction in slope of the time/intensity curve (typically corresponding to a 20% reduction in slope compared to normal tissue). Comparison between MR and radionuclide images resulted in a sensitivity of 71% with a specificity of 96%. Sensitivity is known to be affected by reduced dependence on viability in the distribution of Gd-HP-DO3A (an extravascular agent) which results in some false negative comparisons when compared to radionuclide distribution.

986-10 Myocardial First Pass Imaging With MS-325, a New Intravascular Magnetic Resonance Contrast Agent

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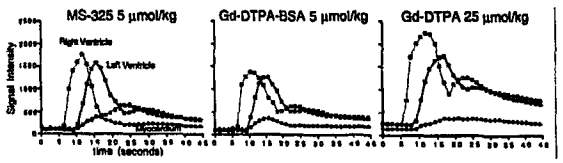
We have compared the first pass myocardial enhancement profile of MS-325, an MR angiographic imaging agent, to that of a non-clinical intravascular agent (Gd-DTPA-labeled bovine serum albumin [Gd-DTPA-BSA]) and to the clinical extracellular agent Gd-DTPA. MS-325 is a novel small-molecule Gd chelate which binds reversibly to albumin (90–95%). Gated dynamic IR Turbo-FLASH imaging of 4 pigs was performed after ear vein bolus injection (2 sec) of the agents at doses which produce equivalent peak myocardial enhancement. As an indicator of degree of intravascular distribution, the following ratio was calculated during the first pass time interval:



The first pass myocardial enhancement profile of MS-325 was parabolic (R = 0.72 ± 0.21) and matched that of Gd-DTPA-BSA (R = 0.69 ± 0.31) (see figure below), demonstrating confinement of MS-325 to the intravascular space. In contrast, due to added enhancement (app. 50%) from rapid extravasation, the Gd-DTPA profile was broadened and failed to return to baseline (R = 0.15 ± 0.05, significantly less than MS-325 and Gd-DTPA-BSA, $p < 0.01$).

In conclusion, MS-325 may enable better clinical estimation of regional myocardial blood volume than currently approved MR contrast agents.

986-11 Regional Myocardial Perfusion by Ultrafast Magnetic Resonance Imaging in an Experimental Animal Model

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Aim of the study was to assess regional myocardial perfusion by Ultrafast MRI at 0.5T in conjunction with the intravenous injection of a bolus of Gadopentetate (Gd-DTPA) in open chest pigs. Different levels of coronary blood flow were generated in 9 animals by adenosine infusion or by a mechanical occluder on the proximal left anterior descending coronary artery. Reference values of myocardial perfusion were obtained by radiolabelled microspheres injected into the left atrium. 64 consecutive, single slice, ECG triggered, diastolic, short-axis images of the left ventricle were obtained while Gd-DTPA (0.05 mmol/Kg) was injected. Peak intensity, time to peak, wash-in slope and cross-correlation coefficient were computed from each time-intensity curves, derived from 4 regions of interests (ROIs) drawn on left ventricular myocardium. Values from the the inferior wall ROI were used as reference to evaluate the relative differences of the remaining anterior, lateral and septal walls ROIs. A total of 30 injections were performed within a coronary blood flow range of 0.005–1.9 ml/g/min. The cross correlation coefficient showed the best correlation with coronary blood flow ($n = 90$, $r = 0.86$, $p < 0.001$). Peak intensity ($r = 0.72$, $p < 0.001$) and wash-in slope ($r = 0.28$, $p < 0.05$) also correlated with flow, whereas the time to peak did not ($r = 0.04$, p = ns). In conclusion, contrast enhanced ultrafast Magnetic Resonance allowed an accurate evaluation of regional myocardial perfusion heterogeneity in the experimental animal. The cross correlation coefficient resulted the most efficient parameter for the relative quantitation of coronary blood flow.

986-12 The Potential for Determination of Myocardial Viability Following Reperfusion With Gd-DTPA Enhanced MRI

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This study was undertaken to determine the potential for MRI determination of infarct size/tissue viability at varying time periods post infarction/reperfusion. In a canine model, the left anterior descending coronary artery was occluded for 2 hours, followed by reperfusion for 2 hours (2 dogs), 4 hours (2 dogs), 1 day (2 dogs), 1 week (8 dogs), 2 weeks (2 dogs), and 3 weeks (2 dogs). In each experiment, the heart was excised 1 hour into a constant infusion of Gd-DTPA (bolus of 0.3 mmol/kg followed by 0.01 mmol/kg/min) for establishment of equilibrium of the contrast agent in tissue, and 30 minutes following intravenous thallium injection (as a marker of tissue viability). From each heart, 70–130 samples were obtained for determination of microsphere blood flow, thallium uptake normalized to blood flow, and the distribution volume of Gd-DTPA (λ) which was defined as the [Gd-DTPA tissue]/[Gd-DTPA blood]. The correlation (r) between λ and normalized thallium uptake, the slope of the regression line, and the values of λ in the infarct and normal flow regions are demonstrated in the following table.

Reperfusion period	r	Slope	λ (infarct) flow < 0.4 ml/min/g	λ (normal) flow > 0.4 ml/min/g
2 hrs	−0.83	−1.00	0.80 ± 0.17	0.21 ± 0.07
4 hrs	−0.82	−1.07	0.94 ± 0.28	0.30 ± 0.04
1 day	−0.75	−1.02	0.93 ± 0.13	0.39 ± 0.09
1 week	−0.75	−0.91	0.84 ± 0.26	0.24 ± 0.10
2 weeks	−0.80	−1.80	0.76 ± 0.15	0.25 ± 0.06
3 weeks	−0.61	−0.83	0.52 ± 0.15	0.28 ± 0.08

Therefore, up until and including 2 weeks following infarction, the clinical determination of myocardial viability, through the absence of increases in λ (Gd-DTPA enhancement on MRI imaging) may be feasible with MRI, as early as 2 hours following reperfusion.

986-13 Evaluation of Q Wave and Non-Q Wave Myocardial Infarction by Magnetic Resonance Imaging

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Magnetic resonance imaging (MRI) can reveal the changes in the myocardium following an acute myocardial infarction (AMI). Its role in the evaluation of pts with Q wave (Group-GI) AMI and with non-Q (GII) AMI is not reported yet. To assess its utility in this set we conducted a prospective analysis of 79 pts with AMI from February 92 to December 94. All pts underwent MRI and cardiac catheterization (CC) before hospital discharge. MRI defined the myocardium at risk as the areas with a high uptake of GDTPA-Gadolinium (GADO), which was injected in all cases. Myocardial viability was defined as the areas with GADO washout < 30 min. There were 61 pts in GI and 18 pts in GII. Ejection fraction was 0.44 in GI and 0.49 in GII by MRI and 0.42 in GI and 0.50 in GII by CC. CC found 25 occluded AMI related arteries in GI and 3 in GII. MRI showed a similar myocardium at risk in both groups, but identified a larger area of early washout in GII (67% of the myocardium at risk vs. 38% in GII). There was a subepicardial area of early washout in 10 pts in GI and in 16 pts in GII. Four pts died in-hospital, all in GI. Another GI pt died after 10 months. All pts who died had early GADO washout in < 40% of the MRI defined myocardium at risk. MRI was repeated in 56 pts of GI (all survivals) and in the 16 pts of GII. Global ejection fraction was 0.44 in GI and 0.54 in